

20 feet in height. There is also some quantity of younger larch, mixed with Scotch fir and a little spruce, planted about eight years ago, which is doing pretty well. The soil is evidently best adapted for the growth of larch.

A few deodars have been planted in the rides for ornamental purposes. They are growing very slowly in the lower and damper portions of the wood, but a little better on the uplands.

A good deal of damage is, Mr. Gulliver informed me, done by rabbits to the young trees, and last year a disastrous fire occurred, which swept through and destroyed some thirty acres of plantation before it could be stopped, although the soldiers from the neighbouring barracks were turned out to aid in extinguishing it. The damage done is so apparent, that I think it would convince any of those who doubt the necessity of putting a stop to forest fires in India, and maintain that they do no harm. Luckily, the trees in this portion of the wood were of no great value, so that the loss will be comparatively trifling.

The revenue of the forest for 1870-71 was 368*l.*, and expenditure 288*l.*

Most of the revenue is derived from the sale of oak bark, which is small but of good quality. Last year 23*1/2* tons were sold, which is nearly 10 tons less than the usual yield.

Scotch fir thinnings realize from 6*d.* to 8*d.* per tree on the spot, and larch a little more. On the whole this wood does not repay a visit, and I merely inspected it as I was in the vicinity seeing Portsmouth Dockyard.

The DEAN FOREST.

Extent and Divisions.—This forest is situated in the county of Gloucester, to the north and west of the River Severn. The total acreage of the forest within the perambulation is 22,500 acres, but of this extent there are 3,300 acres in which the Crown has only mineral rights, leaving 19,200 acres in which the Crown has the right to the soil.

The forest is under the charge of Sir James Campbell, as deputy surveyor, with one assistant. Sir James has also charge of the High Meadow Woods, which adjoin.

His residence at Whitemead Park, near Coleford, is very conveniently situated as regards the forest, which extends on either side. There were until lately two assistants to

the deputy surveyor, but most of the available area having been planted up, and the trees, as a rule, being past harm's way, one has been dispensed with, and the emoluments of the one retained slightly increased.

Nurseries and Plantations.—No nurseries are now kept up, owing to the cessation of planting for the reasons given above. Any plants required for filling up vacancies, &c. are purchased from the nurserymen, who have also supplied the coniferous seedlings for the small plantations made during the past two years, to be noticed hereafter.

I visited 12 plantations of various ages varying from those of 1844 to the present season, viz., Bream's Eves, Milk Wall, and Hangerbury, of 1844; Bourt's and Middle Ridge, of 1847; Churchill, 1856; Moseley Green, 1858; St. John's and Cinderford, of 1859; Little Kensley, 1869-70; Bream New Enclosures, 1871; and Bradley Hill, 1871-72.

I had thus an opportunity of judging of the growth of the young trees over a period of nearly 30 years.

The plantations are mainly oak, with fir and larch nurses, which have been removed entirely in those of the earlier dates. Here and there I observed a little chestnut and walnut, but nowhere in any quantity.

The soil cannot be considered generally favourable for the growth of oak or any hard wood tree. In the hollows it is, as a rule, clay, and only here and there do we find a bed of good loam. The country is very undulating, and on all the upper portions the rock crops out. On the outer edge it is generally limestone, with sandstone and conglomerate in the interior circles.

The larch does well, and the Scotch fir exhibits a very fine and heathy growth; in fact, in some places where there is scarcely any soil over the rock, it is marvellous to see fine straight trees of a most robust appearance.

The Scotch fir is not, however, of much use here in a financial point of view, as there exists a strong prejudice against it for pit-props, for which there is a great demand. I cannot help thinking that this prejudice must be, to a great extent, unsounded or based on insufficient data, for it is the tree mainly used for this purpose in the extensive mines in Lanark and Ayrshire, in Scotland, and I have never heard there of complaints as to its brittleness, which is the reason adduced for its not being used here. The nature of the soil, or other causes, may, however, affect the timber injuriously.

Of the younger plantations, Churchill, which is the first formed by the present deputy surveyor in 1856, is doing

particularly well. Little Kensley (1869-70), extending over 137 acres, newly drained and planted with oak and beech, with nurses of spruce fir, promises well; and Bradley Hill, which is just finished, in fact, some of the nurses have still to be put in, and covers about 80 acres, afforded me an opportunity of observing the healthy state of the recently transplanted trees, and the few casualties which had taken place.

The deputy surveyor does not plant out the nurses first and hardwoods afterwards, as is done in the New Forest, finding it better to put both out together, the situations not being so exposed as in Hampshire.

He digs pits for all descriptions, and considers it advantageous to do so, and that, although the first cost is, of course, greatly beyond that of planting a similar area with the nurses slitted or notched in, it is amply repaid by the immunity from loss, and consequent necessity of replanting, and by the faster and straighter growth of the trees year by year. I note this particularly, as it is the only instance in which I have found the coniferous trees pitted in this country, and because in my report on the Scotch Forests I have expressed an opinion that we rather over-do the pitting in India, that is, that the results are not commensurate with the great extra expense. Sir James Campbell's experience tends the other way.

For oak, he makes use of pits from 10 to 12 inches deep and 18 to 20 inches square, and for the fir and larch nurses, pits of about the same depth and one foot square. These he has dug at not more than 1s. per hundred, which appears very moderate.

The later plantations of oak with larch nurses are formed in alternate rows of these trees, four feet apart, and the average cost is about 8*l.* per acre, although, in some cases, it is much more or less, according to the nature of the soil, circumstances under which it is planted, &c., &c. This rate contrasts very favourably with that existing in other localities.

Sir James Campbell has experimented very successfully in planting out young trees, principally oak, in the common (uninclosed) lands, and, in fact, on what might be termed village greens. No objections have been raised to this, and the villagers are now reaping the advantages in the shape of improved pasture for their cattle and sheep, and shelter from the cold in winter and excessive heat of the sun in summer, whilst the appearance of the village or hamlet is greatly improved by the presence of the grove, or what we should call in Madras *tope*, of trees.

Near Cinderford a considerable tract has been planted out in this way, and a careful record kept of the growth compared with that of seedlings of the same year left untransplanted in and around the nursery. The smallest trees of the former now surpass, both in height and girth at six feet from the ground, the largest of the latter.

Fires are unfortunately not uncommon in the plantations, and I saw several tracts in which the trees had been destroyed by them. A spark from a miner's pipe or gipsy's fire suffices in summer to set the grass on fire, and, once lit, it is almost impossible to extinguish. A greater subdivision of the plantations into small blocks by means of ridges, which act as "fire traces," would appear advisable.

Woods.—I visited 20 different woods or inclosures, including those of the High Meadow estate, ranging from the scattered trees of 1707 and 1782, to the fine and regularly trained woods of the beginning of the present century. I would particularize those of Astonbridge (1816), Sallow Vallets (1812), Buckholt (1816), Perch (1816), Burnhill (1809), Nag's Head (1814), situated on a gentle slope with a southerly exposure, and Staple Edge (1814), and Cockshot (1815), on the other side of the forest, as the finest I saw, and containing a large capital of finely grown oak timber.

There has been little or no felling of mature trees for some years past, and I believe the Admiralty has now ceased to indent on the forest for supplies.

The blight has done much damage recently, and seems to increase year by year, whole tracts being left leafless during the summer by its action. At the time I visited the forest (in February) there was, of course, none; but Sir James explained to me that it appeared along with the young leaves or leaf buds, in the shape of a canker or unhealthy spot; that his attention was invariably attracted to it by the myriads of small flies which hovered about the affected parts; that shortly a sort of caterpillar developed itself, which preys upon the leaves and young shoots until it arrives at the moth stage, when it departs, leaving the tree leafless and sickly.

The matter appears to demand careful attention, and an accurate study of the symptoms, in order to arrive at some idea of the cause, whether atmospheric or the result of some particular chemical action of the soil, which is so rich in mineral deposits. The damage done is very great, and financially must represent a very large sum per annum.

Sir James sells the thinnings at 30s. per chord all round, and for small wood, such as tops, loppings, branches, and underwood, he realizes an average price of 15s. per chord of 128 cubic feet. Most of this small wood is taken for the manufacture of pyroligneous acid and naphtha, after which it is sold as charcoal.

Very little charcoal is now manufactured by the old method; that received from the naphtha works is not so good as what is manufactured specially as charcoal, as all the best qualities of the wood are extracted, still it is found cheaper to use a greater quantity, as the manufacturers of the naphtha can afford to lower the price for what would otherwise be useless and unprofitable to them.

I have omitted to mention that there are some remarkably fine beech trees in this forest, and that the soil and climate would appear well adapted for an experimental plantation, on the German system, of mixed oak and beech.

The revenue of the forest for 1870-71 was 10,838*l.*, and the expenditure 7,878*l.*

Fencing.—Turf banks may be said to constitute the fence of the forest, and Sir James Campbell retains an improved description in the formation of inclosures.

His turf banks are $3\frac{1}{2}$ feet high, and faced with stone up to 3 feet from the ground, with a wire running along stakes fixed in the bank, making the whole nearly $4\frac{1}{2}$ feet high, which is found necessary to exclude ponies and cattle, which manage to get through or over any other description of fence. Quick is planted along the inner side, and trained along the top, which, when fully grown, renders the inclosure quite impervious. This method of inclosing is rather expensive, costing nearly 2*s.* per running yard, and I must say I prefer Mr. Cumberbatch's hoop-iron fence, although it might not suit Gloucestershire.

Short History of the Dean Forest.

The history of the formation and management of this forest so closely resembles that of the New Forest, of which I have already given a description at some length, that I shall only state briefly the leading features in connexion with it.

The first legislation with regard to it appears to have been in the reign of Charles the Second, when an Act was passed, authorising the throwing out of pieces not less than

500 acres in extent, in which the trees were so far grown up as to be free from injury by cattle, and the inclosing and planting an equal quantity of open forest. By another Act in the reign of George the Third (already quoted with reference to the New Forest), further powers as to inclosing and planting were granted as in the New Forest, and further legislation as to the rights of the Crown in the minerals and substrata, and those of the free miners and owners of what are called "gales," has taken place during the present reign. It must be borne in mind that the mining interest is predominant in the Dean Forest, and that the mineral rights form far the most valuable portion of the property. This renders it difficult, if not impossible, to exclude persons from any part of the forest, which is intersected with paths, roads, and even tramways and light railways, leading to the various mines, which are often situated in the middle of an inclosure or plantation. Applications for the sinking of new shafts are referred to the deputy surveyor as regards the value of the timber, its removal, &c.; but, considering the value of the Crown royalty on each mine sunk, it would be inexpedient, and probably fruitless, were he to raise objections to any piece of forest or plantation being given up, unless peculiar circumstances, which might have escaped the notice of the Government mining engineer, justified his doing so.

The number of free miners registered is 1,280, of whom some have since died or left the country, and the number of existing grants of "gales," or rights to minerals, is stated by the return of 1863 to be 500, but that number has probably been greatly exceeded since that date, as numerous mines for coal and iron have been and are being constantly sunk.

The prescriptive or communal rights in the forest as to cutting of turf, grazing, &c., are nowhere clearly defined as in the register of those entitled to rights of common. It is curious that the Act of Parliament which authorised the enclosure and planting of certain areas does not direct any inquiry as to the nature of the common rights, nor as to estates or persons entitled to the privilege, in a similar manner as was prescribed for the New Forest. This will probably have to be done sooner or later, although, at present, I am informed that everything is going on smoothly, no encroachments being made by the commoners, and the Crown officers not being over strict as to whether those who exercise rights of pasturage or turbary are legally entitled to them or not.

Under existing regulations, not more than 11,000 acres can be enclosed at any one time for the growth of timber, and Sir James Campbell estimates the area now actually under timber at about 14,500 acres.

HIGH MEADOW WOODS.

This estate is situated in the counties of Gloucester, Monmouth, and Hereford, and extends over 3,400 acres, all either old woods or plantations, and 60 or 80 acres let to tenants either as arable or meadow lands. The property was purchased under the authority of an Act of George the Third, which recites the advantages to be gained by the purchase in the quantity of thriving oak growing on the estate, its contiguity to the Forest of Dean, facilities for the transport of timber by water, &c. Some of the woods are particularly fine Nockalls, Marians, Mailest, and the view from Symond's Rock of the wooded banks of the Wye is most gratifying to the forester, as well as to the lover of the picturesque.

The estate, as already stated, is under the charge of the deputy surveyor of the Dean Forest, and I do not consider it necessary to enter into further details.

The property is, of course, freehold of the Crown, and there are no common or prescriptive rights.

The revenue derived for 1870-71, was 5,176*l.*, and the expenditure only amounted to 1,827*l.*, leaving the handsome profit of upwards of 3,000*l.* on as many acres.